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NANOTECHNOLOGY FOR HEALTH- A SHORT REVIEW

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Abstract:

Applications of nanotechnology to medicine and physiology imply materials and devices designed to interact with the body at sub cellular (i.e., molecular) scales with a high degree of specificity. This can be potentially translated into targeted cellular and tissue-specific clinical applications designed to achieve maximal therapeutic efficacy with minimal side effects. The chief scientific and technical aspects of nanotechnology are introduced, and some of its potential clinical applications are mentionable.

Keywords: *Nanotechnology, Medicine, Potentially, Therapeutic*

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INTRODUCTION:

At Nano scale, materials have novel properties like increased strength, resiliency, electrical conductivity [1-9]. One of the most common example Nano devices is the iPod Nano which uses microscopic memory chips for increasing the storage capacity. Other examples from our daily lives include use of nanoparticles in lotion which help in easy absorption. A publication "Nanomedicine: Nanotechnology for Health" gives us an excellent overview for the products releated to health [10-14]. Silver nanoparticles can be used in eliminating fungus and preventing odours in shoes and refrigerators. These nanoparticles retain their infection-inhibition properties but at the same time allowing greater penetration into organic and inorganic molecules [15-18]. It is used to prevent in fectionin burn patient. Life sciences combined with nanotechnology has given rise to nano biotechnology that has been given insights in to disease processes, hence identifying more efficient biomarkers and understanding the mechanism of drug action[19-21]. A chemo therapic agent created by Abraxis is another lively example. Bioscience is used to destroy the tumor cells. The chemotherapy is delivered directly into tumour cells because tiny particles penetrate cell membrane easily. Nano materials are used in treating glaucoma patients also. Many vaccines like hepatitis and malaria are also utilizing nanotechnology [22-24].

Nanomaterial vaccines are used to produce greater immunity to pathogens by delivering medications directly to specialized dendritic cells in the immune system[120]. Glucose levels are being monitored with the help of patient monitoring devices. Miniature biochips detect increase in glucose level [25-26]. These particles are also helping epileptic individuals. Implants Put in human body detect seizures activity before it is manifested and release medication to prevent the attack. Nano materials are being used in regenerative science. It helps in creating artificial skin, cartilage and bone for human use [27-29]. Many chronic diseases like diabetes and neuro degenerative disease are being cured with this nanotechnology. In the following paragraphs some of the applications are discussed in details.

Nanodevices

Single walled carbon nano tubes are being used as a platform for investigating surface-protein and protein-protein binding and also to develop highly specific electronic bio molecule detectors. The scheme combined with the sensitivity of nano tube electronic devices provides highly specific electronic sensors for detecting clinically important bio molecules like antibodies associated with human autoimmune disease.

(a)Nano biosensors:

The Nano sensors with immobilized bio receptors probes which are selective for targets analyze molecules are called nano biosensors. These can be integrated into other Technologies like lab-on-a chip to facilitate molecular diagnostics. Their applications include detection of microorganisms in various samples, monitoring of metabolites in body fluids and detection of tissue pathology such as cancer. Their portability makes them ideal for POC applications but they can also be used in laboratory settings.

(b) Nano wire biosensors

Surface properties of these can be easily modified therefore they can be decorated with virtually any potential chemical or biological molecular recognition unit, thus making the wires themselves analyzed independent. Boron doped silicon nano wires are used to create highly sensitive, real time electrically based sensors for biological and chemical species.

(c)Viral nanosensors

Essentially the virus particles are called as biological nanoparticles. Herpes Simplex Virus (HSV) and adenovirus have been used to trigger the assembly of magnetic nano beads as a nano sensor for clinically relevant viruses. By using a magnetic field, as few as five viral particles can easily be detected in a 10 ml serum sample.

(d) PEBBLE nanosensors

Probes encapsulated by Biologically Localized Embedding (PEBBLE) nanosensors consists of sensor molecules which are entrapped in a chemically inert matrix by a micro emulsion polymerization process that produces spherical sensors in the size range of 20 to 200 nm. These are capable of real time inter and intracellular imaging of ions and molecules and are insensitive to interference from proteins.

(e) Optical biosensors

Many biosensors which are currently marketed rely on the optical properties of lasers to monitor and quantify interactions of bio molecules that occur on specially derived surface or biochips. Example: Surface Plasmon.

CONCLUSION:

Nanomedicine approaches hold great promise in revolutionizing therapeutic and diagnostic modalities in the clinical treatment of vascular diseases. The current review has attempted to capture comprehensively the various nano construct fabrication and formulation strategies in

this area. Many of these reports are still based on in vitro or preclinical small animal model in vivo investigations. Successful clinical translation of these approaches can be realized only through efficient optimization of the structure-function parameters of the vehicle itself, the payload encapsulation characteristics and appropriate delivery mechanisms, suitable cellular/molecular targeting mechanisms, and statistically established demonstration of safety and treatment benefit in appropriate pre-clinical models.

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